Dryden Flight Research Center

National Aeronautics and Space Administration

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Center Overview

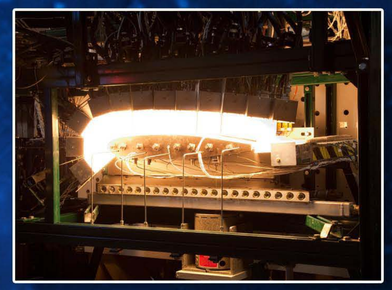
- Center Director: David McBride
- History
  - What became the NASA Dryden Flight Research Center began in September 1946 with the arrival of the first engineers at Muroc Army Air Field. The "Muroc Unit," assigned to support the X-1 project, became a permanent facility on September 7, 1947. The staff numbered 27 at the time and was managed by Langley. In 1976, the facility was renamed the Dryden Flight Research Center.
  - Its initial role in the 1940s and 1950s was flight research with the X-planes, including the X-1, D-558-I, D-558-II, X-3, X-4, X-5, and XF-92A. In the 1960s, the X-15 and the Lifting Bodies were flown. The initial tests of the Lunar Landing Research Vehicle were also conducted here, as well as flights with the XB-70. The initial glide flights of the Space Shuttle were made at the center in 1977. The center was an alternative landing site for Space Shuttle missions from 1981 to 2011.
  - The center's flight research activities have branched out over the decades. The X-planes dominated its activities in the decades spanning 1940-1980. In the 1970s activities shifted to research on supercritical wings and winglets to reduce drag, and tests of digital-fly-by-wire flight control systems, intelligent flight control systems, and digital engine controls. Other research was done using the lower cost and risk model of remote piloted research vehicles.
  - Over the years DFRC has grown to become the center that it is today, conducting ground and flight test activities that support the Aeronautics, Science, and Exploration Systems Mission Directorates.
- Center Staffing
  - 570 civil servants
  - 680 contractors

Thermal/Fluids Analysis

- Software
  - Thermal: MSC.Nastran, MSC.PThermal, MSC.Marc, Thermal Desktop
  - Fluids: Gridgen, ICEM-CFD, Chimera Grid tools, Vulcan, Overflow, Wind, DPLR, Beggar, ISAAC, MACH2/3, AVUS, TetrUSS, Tranair, FUN3D, USM3D, Cart3D, STAR-CCM+, APAS, Datcom, CBAero, av1, Panair, Tranair, ZONAIR, RJPG, SRGULL, CEA, GECAT, OTIS, POST
  - Aerothermal: TPATH, DAP
- Capabilities
  - Thermal
  - Coupled Thermal-Structural
  - Aerothermal & Ablation
  - Aeroloads
  - Flow Physics
  - Flight performance prediction & trajectory analysis/optimization
- Current Challenges/Issues
  - Modernization of some old codes, knowledge transfer

Thermal/Fluids Testing

- Facilities
  - 164' x 120' High Bay
  - 20' x 23' x 10' Large Nitrogen Chamber
  - 1' x 1' x 1' Small Nitrogen Chamber
  - Blackbody Furnace
  - Thermal Cycling Furnaces (4)
  - 6' x 6' x 6'Environmental Chamber
  - Water tunnel
- Capabilities
  - Ground Test:
    - Thermal & combined thermal-structural loading of test articles up to full flight vehicles for development/qualification/calibration testing
    - High-temperature instrumentation attachment method development & validation
  - Flight Test:
    - Subsonic & supersonic testbed aircraft with choice of measurement systems
      - Thermal: qualitative or quantitative in-flight IR measurement, light weight, full-field fiber optic sensing, conventional TCs/RTDs
  - Schlieren techniques for flow visualization
- Current Challenges/Issues
  - Nearing completion of major upgrade to Flight Loads Laboratory



Thermal/Fluids Staffing

- Aerodynamics Branch
  - Branch Chief: Jenn Cole
  - ~30 civil servants
- Aerostructures Branch
  - Branch Chief: Starr Ginn
  - ~30 civil servants

Current Projects/Programs Supported

- Structurally Integrated TPS (SITPS)
- Falcon Hypersonic Technology Vehicle (HTV-2, Air Force/DARPA)
- Environmentally Responsible Aviation (ERA)
- Supersonic Boundary Layer Transition Experiment (SBLT)
- Background Oriented Schlieren (BOS)
- Science Aircraft Pods (Ikhana, Global Hawk, G-III)
- Channeled Cenerbody Inlet Experiment (CCIE)

Major Accomplishments/Awards/Recognition

- SOFIA Short Science 1 complete
- X-37 successful re-entry
- Completion of advanced re-entry vehicle subcomponent thermal & thermal-structural testing
- Upgrade of FLL radiant heating capabilities begun.

Outlook

- Allocating resources to support NASA's science missions, and focus on green aviation
- Constellation cancellation workforce shift from Orion Pad Abort flight testing to support new NASA direction and programs
- Workforce shifting due to agency ARMD priorities (decreasing Hypersonic support, increasing Subsonic and Supersonic support)